

CLAIMS

What is claimed is:

1 1. An aggregated virtual local area network (VLAN) architecture system  
2 comprising:  
3 a metropolitan area network MAN having at least one of a router and a  
4 switch;  
5 an edge switch connecting the MAN to a super-VLAN, the super-VLAN  
6 comprising at least one of a plurality of sub-VLANs, and wherein the edge switch  
7 applies a modified bridge forwarding rule to exchange a VLAN ID associated with  
8 the sub-VLAN for a VLAN ID associated with the super-VLAN before forwarding a  
9 data packet from the sub-VLAN over the MAN using the at least one of a router and  
10 a switch.

1 2. The aggregated VLAN architecture of claim 1, wherein the edge switch further  
2 applies a modified bridge media access control (MAC) address learning rule to  
3 prevent the data packet from the sub-VLAN from being forwarded to a different sub-  
4 VLAN, the MAC address learning rule comprising a MAC address entry in a  
5 forwarding data base (FDB) for each of the plurality of sub-VLANs and the super-  
6 VLAN.

1 3. The aggregated VLAN architecture of claim 2, wherein the MAC address entry  
2 is added to the FDB for the sub-VLAN and the super-VLAN when a new MAC  
3 address is learned from the sub-VLAN.

1 4. The aggregated VLAN architecture of claim 3, wherein the MAC address entry  
2 is added to the FDB for each of the plurality of sub-VLANs and the super-VLAN when  
3 the new MAC address is learned from the super-VLAN.

1 5. The aggregated VLAN architecture of claim 1, wherein the edge switch applies  
2 the modified bridge forwarding rule to exchange a VLAN ID associated with the  
3 super-VLAN for a VLAN ID associated with the sub-VLAN before forwarding a data  
4 packet from the super-VLAN to a customer associated with the sub-VLAN.

1 6. The aggregated VLAN architecture of claim 1, wherein the VLAN ID  
2 associated with the sub-VLAN is obtained from a header encapsulating the data  
3 packet.

1 7. The aggregated VLAN architecture of claim 6, wherein the header  
2 encapsulating the data packet is an 802.1Q frame tag.

1 8. The aggregated VLAN architecture of claim 5, wherein the VLAN ID  
2 associated with the super-VLAN is obtained from the header encapsulating the data  
3 packet.

1 9. The aggregated VLAN architecture of claim 8, wherein the header  
2 encapsulating the data packet is an 802.1Q frame tag.

1 10. The aggregated VLAN architecture of claim 1, wherein the VLAN ID  
2 associated with the sub-VLAN is obtained from an internal value stored in the edge  
3 switch.

1 11. The aggregated VLAN architecture of claim 1, wherein the VLAN ID  
2 associated with the super-VLAN is obtained from a second internal value stored in  
3 the edge switch.

1 12. A method of aggregating multiple VLANs in a metropolitan area network  
2 comprising:

3 classifying a data packet originating from a sub-VLAN in accordance with an  
4 aggregated VLAN configuration, the aggregated VLAN configuration associating the  
5 sub-VLAN with a sub-VLAN ID and a super-VLAN ID;

6 exchanging the sub-VLAN ID for the super-VLAN ID before forwarding the  
7 data packet to a MAN;

8 classifying a data packet originating from a super-VLAN in accordance with the  
9 aggregated VLAN configuration, the aggregated VLAN configuration further  
10 associating the super-VLAN with a super-VLAN ID and at least one of a plurality of  
11 sub-VLAN IDs;

12 exchanging the super-VLAN ID for the at least one sub-VLAN ID before  
13 forwarding the data packet to a customer associated with the at least one sub-VLAN  
14 ID.

1 13. The method of claim 12, wherein the classification comprises obtaining the  
2 sub-VLAN ID and the super-VLAN ID from a tag in the data packet, and verifying the  
3 obtained VLAN IDs in accordance with the aggregated VLAN configuration values  
4 stored in the switch that performs the classification.

1 14. The method of claim 13, wherein the tag is an 802.1Q frame tag.

1 15. The method of claim 12, wherein the classification comprises obtaining the  
2 sub-VLAN ID and the super-VLAN ID from the aggregated VLAN configuration values  
3 stored in the switch that performs the classification.

1 16. The method of claim 12, further comprising:  
2 preventing the data packet originating from the sub-VLAN from being  
3 forwarded to a different sub-VLAN using a modified MAC address learning rule.

1 17. The method of claim 17, wherein the modified MAC address learning rule  
2 comprises a MAC address entry in a table stored in the switch performing the  
3 classification, wherein the MAC address entry is added for each of the sub-VLAN and  
4 the super-VLAN when the MAC address is learned from the sub-VLAN, and wherein  
5 the MAC address entry is added for all of the plurality of sub-VLANs in the  
6 aggregated VLAN configuration and the super-VLAN when the MAC address is  
7 learned from the super-VLAN.

1 18. An article of manufacture comprising a machine-accessible medium having  
2 stored thereon a plurality of instructions for aggregating multiple VLANs in a  
3 metropolitan area network, comprising:

4 classifying a data packet originating from a sub-VLAN in accordance with an  
5 aggregated VLAN configuration, the aggregated VLAN configuration associating the  
6 sub-VLAN with a sub-VLAN ID and a super-VLAN ID;

7 classifying a data packet originating from a super-VLAN in accordance with the  
8 aggregated VLAN configuration, the aggregated VLAN configuration further  
9 associating the super-VLAN with a super-VLAN ID and at least one of a plurality of  
10 sub-VLAN IDs;

11 exchanging the sub-VLAN ID for the super-VLAN ID before forwarding the  
12 data packet to a MAN and exchanging the super-VLAN ID for the at least one sub-  
13 VLAN ID before forwarding the data packet to a customer associated with the at  
14 least one sub-VLAN ID.

1 19. A method for controlling processing of data packets in a switch connected to a  
2 metropolitan area network (MAN), comprising:

3 propagating a data packet originating from one of a plurality of sub-VLANs,  
4 the plurality of sub-VLANs belonging to a super-VLAN;

5 exchanging a VLAN ID identifying the originating sub-VLAN with a super-  
6 VLAN ID identifying the super-VLAN to which the originating sub-VLAN belongs;

7 controlling the processing of the data packet to the MAN in accordance with  
8 the exchanged super-VLAN ID and a destination Media Access Control (MAC)  
9 address specified in the data packet.

1 20. An edge switch for controlling processing of data packets in a metropolitan  
2 area network MAN, comprising:

3 a port for receiving a data packet on an edge switch originating from one of a  
4 plurality of VLANs, the plurality of VLANs associated with a super-VLAN;

5 a means for assigning a VLAN ID to the data packet that identifies the  
6 originating VLAN;

7 a verifier means for verifying that the assigned VLAN ID matches a value in a  
8 memory of the edge switch;

9 a controller for controlling the processing of the verified data packet to  
10 exchange the verified VLAN ID for a super-VLAN ID that identifies the associated  
11 super-VLAN; and

12 a means for propagating the processed data packet to the MAN.

1 21. The edge switch of claim 20, wherein the means for assigning the VLAN ID  
2 includes deriving the identity of the super-VLAN associated with the originating VLAN  
3 based on the contents of the data packet's source Internet Protocol (IP) address.

1 22. The edge switch of claim 20, wherein the means for assigning the VLAN ID  
2 includes obtaining the VLAN ID from a header encapsulating the data packet.

1 23. The edge switch of claim 20, wherein the value in the memory of the edge  
2 switch is comprised of an aggregated VLAN configuration.

1 24. The edge switch of claim 20, further comprising  
2 a port for receiving the data packet from the super-VLAN;  
3 a means for assigning a super-VLAN ID to the data packet that identifies the  
4 originating super-VLAN;  
5 a means for verifying that the assigned super-VLAN ID matches a second  
6 value in a memory of the edge switch;  
7 the means for controlling the processing of the verified data packet further  
8 including a means to exchange the verified super-VLAN ID for a VLAN ID that  
9 identifies the destination VLAN; and  
10 the means for propagating the processed data packet further including a  
11 means for propagating the data packet to a customer associated with the  
12 destination VLAN.